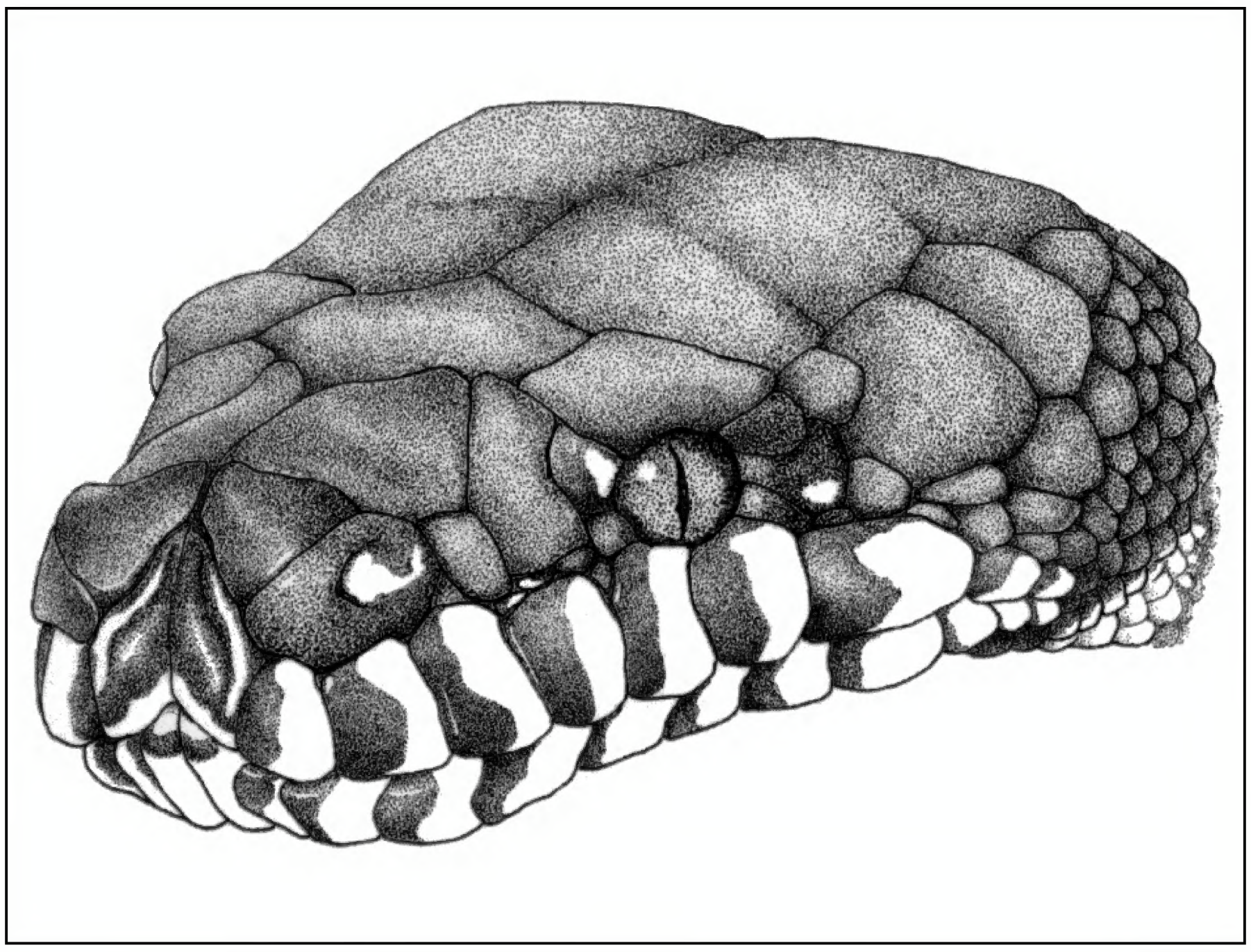
BULLETIN
of the
Chicago Herpetological Society

Volume 34, Number 5
May 1999



BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY
Volume 34, Number 5
May 1999

Courtship Behavior and Systematics in the Subtribe Nectemydina: 2. A Comparison above the Species Level and Remarks on the Evolution of Behavior Elements (translated by Uwe Fritz) . . . . . .Uwe Fritz 129

Nest Site "Selection" and Red-eared Sliders (*Trachemys scripta elegans*) . . . . . .John K. Tucker 137

Book Review: *Proceedings of the EMYS Symposium Dresden 96* edited by Uwe Fritz, Ulrich Joger, Richard Podloucky and Jean Servan (language editor, James R. Buskirk) . . . . . .J. Alan Holman 138

HerPET-POURRI . . . . . Ellin Beltz 140

Herpetology 1999 143

The Tympanum . . . . . Lisa Koester 144

Letter from the President . . . . . Audrey Vanderlinden 145

Unofficial Minutes of the CHS Board Meeting, April 16, 1999 146

Advertisements 147

Cover: Boelen's python, *Morelia boeleni*. Drawing by Kim Gray-Lovich, Zoological Society of San Diego.

STAFF

Editor: Michael A. Dloogatch
Advertising Manager: Ralph Shepstone

1999 CHS Board of Directors

Audrey Vanderlinden, President
Michael A. Dloogatch, Vice-President
Gary Fogel, Treasurer
Karen Bielski, Recording Secretary
Lori King-Nava, Corresponding Secretary
Gino Martinez, Membership Secretary
Greg Brim, Sergeant-at-Arms
Jennie Picciola, Member-at-Large
Jenny Vollman, Member-at-Large
Donald G. Wheeler, Member-at-Large
Steve Spitzer, Immediate Past President

The Chicago Herpetological Society is a nonprofit organization incorporated under the laws of the state of Illinois. Its purposes are education, conservation and the advancement of herpetology. Meetings are announced in this publication, and are normally held at 7:30 P.M., the last Wednesday of each month.

Membership in the CHS includes a subscription to the monthly *Bulletin*. Annual dues are: Individual Membership, $22.00; Family Membership, $25.00; Sustaining Membership, $50.00; Contributing Membership, $100.00; Institutional Membership, $38.00. Remittance must be made in U.S. funds. Subscribers outside the U.S. must add $12.00 for postage. Send membership dues or address changes to: Chicago Herpetological Society, Membership Secretary, 2060 N. Clark Street, Chicago, IL 60614. Publications are sent to U.S. members via third class bulk mail; the post office does not forward such mail, even if a special request is made to forward magazines.

Manuscripts published in the *Bulletin of the Chicago Herpetological Society* are not peer reviewed. Manuscripts should be submitted, if possible, on IBM PC-compatible or Macintosh format diskettes. Alternatively, manuscripts may be submitted in duplicate, typewritten and double spaced. Manuscripts and letters concerning editorial business should be sent to: Chicago Herpetological Society, Publications Secretary, 2060 N. Clark Street, Chicago, IL 60614. **Back issues** are limited but are available from the Publications Secretary for $2.50 per issue postpaid. **Visit the CHS home page at <http://www.Chicagoherp.org>.**

The BULLETIN of the Chicago Herpetological Society (ISSN 0009-3564) is published monthly by the Chicago Herpetological Society.

Copyright © 1999.

Bull. Chicago Herp. Soc. 34(5):129-136, 1999

Courtship Behavior and Systematics in the Subtribe Nectemydina
2. A Comparison above the Species Level and Remarks on the Evolution of Behavior Elements [1, 2]

Uwe Fritz [3]
Wilhelma, Zoologisch-Botanischer Garten
Postfach 501227
D(W)-7000 Stuttgart 50
Germany

Translated from the German by Uwe Fritz [4]

Abstract

Based on a literature review and unpublished data of the author, the male courtship behavior of turtles of the genera *Chrysemys*, *Graptemys*, *Malaclemys*, *Pseudemys*, *Trachemys* (= subtribe Nectemydina), and *Deirochelys* is analyzed and its significant elements are applied to systematics above the species level. The results are discussed in a zoogeographic-evolutionary context. Head-nodding in a vertical plane is widely distributed in chelonian courtship and is a plesiomorphic character. Claw vibration is a synapomorphy of the subtribe Nectemydina, and claw vibration from a position above the female is a shared derived character of *Pseudemys* species. The different courtship modes represented by the species of the subtribe Nectemydina evolved from a common ancestral behavior pattern consisting of head-nodding plus claw vibration. Manifold variations of this basic pattern developed as character displacements. Today the highest diversity of courtship patterns occurs in the area with the highest species diversity, the southeastern United States. Differences in courtship which probably function as isolating mechanisms are listed.

Introduction

Behavioral characters have long been used to distinguish between closely related, morphologically similar, or otherwise indistinguishable species. However, only a few cases are known where strictly inherited behavior patterns are characteristic for higher taxa (Mayr, 1975). As a herpetological example, Zimmermann and Zimmermann (1988) recently presented a remarkable study which has encouraged intense, constructive discussions and highlighted the often impressive value of behavioral characters in taxonomic studies above the species level.

In the first part of this study (Fritz, 1990; also the English translation in Bull. Chicago Herp. Soc. 33(11):225-236, 1998), the utility of courtship behavior in the taxonomy of the turtle genus *Trachemys* was examined at the species level. Herein, in the second part of the study, it will be demonstrated that the complex courtship of turtles in the subtribe Nectemydina [the New World terrapins, in a broader sense than usually applied], also yields interesting conclusions pertaining to the higher taxonomy of these chelonians. [Editors' note: in this translation, "terrapin" is used for the German "Schmuckschildkröte," the vernacular term for a turtle of the genus *Trachemys*, *Pseudemys*, *Deirochelys*, or, less frequently, *Chrysemys*].

Claw vibration as a characteristic behavioral trait of the subtribe Nectemydina

Several authors have demonstrated over the years that the long-known characteristic claw vibration behavior of the red-eared slider (*Trachemys scripta elegans*) is a common behavior in the courtship display of aquatic turtles of the subfamily Emydinae (see Appendix). Moreover, until now, this behavior has been described only for species of the subtribe Nectemydina *sensu* Smith and Smith (1980), with the possible exception of the chicken turtle (*Deirochelys reticularia*; see Krefft, 1951).

It is highly improbable that the most complicated motion patterns displayed during claw vibration behavior would have developed independently several times through evolutionary convergence at the subfamily level or a lower taxonomic level.

Taking this into account, the claw vibration behavior clearly proves to be a shared derived character, a synapomorphy of the subtribe Nectemydina (possibly including *Deirochelys*). This character, in addition to many morphological criteria, serves to unite this subtribe as a natural group (Figure 1).

Krefft (1951) published anecdotal observations on the courtship of a single captive *Deirochelys*. However, the claw vibra-

---

1. Citation of original article: Fritz, Uwe. 1991. Balzverhalten und Systematik in der Subtribus Nectemydina 2. Vergleich oberhalb des Artniveaus und Anmerkungen zur Evolution. Salamandra 27(3):129-142. Figures have been reprinted with permission.

2. This study is based upon the material of an MA thesis prepared at the Institute for Zoology at the University of Stuttgart-Hohenheim. This work was sponsored by a grant from the *Studienstiftung des deutschen Volkes*.

3. *Present address*: Staatliches Museum für Tierkunde, Forschungsstelle, A.-B.-Meyer-Bau, Königsbrücker Landstrasse 159, D-01109 Dresden, Germany. E-mail: museum.fuer.tierkunde@sz-online.de

4. Translation was edited by James N. Stuart and Michael Dloogatch.

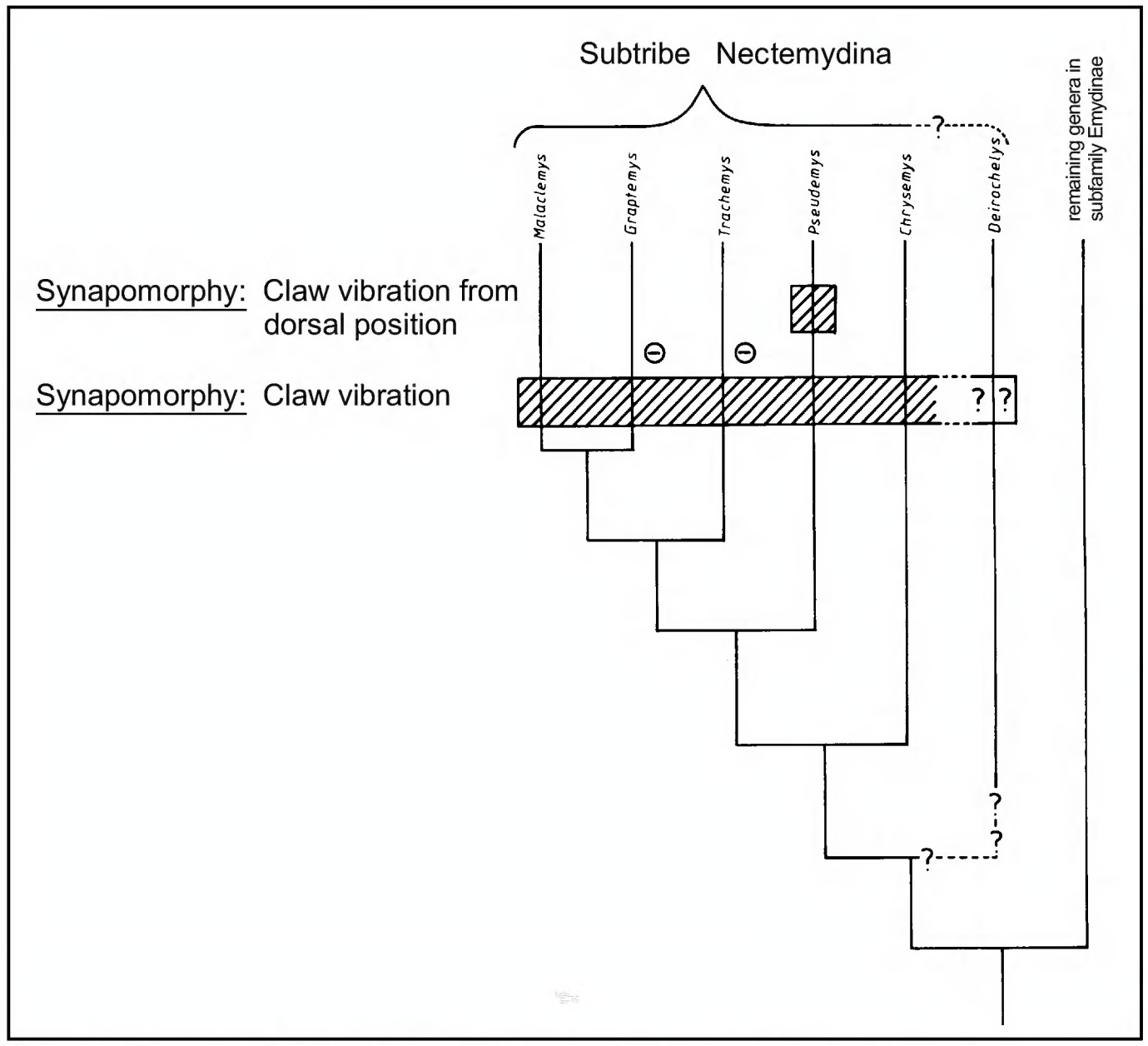


Figure 1. Cladogram of the subtribe Nectemydina showing courtship elements of taxonomic significance. For *Deirochelys* see discussion in text. Branches of cladogram were modified from Bramble (1974), Obst (1985), and Seidel and Smith (1986). The symbol ⊖ indicates reduction (lack) of claw vibration behavior in certain species.

tion behavior exhibited by this specimen was directed towards individuals of other turtle species. Moreover, the observed male was not an adult.

The foreclaws of male *Deirochelys* are not elongated. If the observations by Krefft of claw vibration behavior are eventually verified, this would be, with the possible exception of *Malaclemys* (Sachsse, 1984), the only known case where the behavior element "claw vibration" is present in a species without this obvious sexual dimorphism [elongated foreclaws in males]. However, according to Sachsse, the claw vibration behavior in *Malaclemys* is "only rudimentary compared with [that of] *Graptemys* and *Chrysemys*," and is not always displayed during courtship. Hence, claw vibration without the obvious sexual dimorphism is surely an exception to the rule. Therefore the observations by Krefft should be treated with caution and a more detailed study of the courtship of *Deirochelys* is most important.

The relationship of *Deirochelys* to other emydids is still open to debate. Loveridge and Williams (1957) and some other authors (e.g., McDowell, 1964) favored a close relationship with *Emydoidea blandingii* because of a certain similarity in general habitus and in morphology, whereas recent osteological, paleontological and biochemical results clearly refute this arrangement (Bramble, 1974; Jackson, 1978; Frair, 1982; Gaffney and Meylan, 1988; Seidel and Adkins, 1989). According to these recent studies, *Deirochelys* is more closely related to turtles of the subtribe Nectemydina, as was assumed prior to the study by Loveridge and Williams (1957); this fact is reflected by the color pattern of the soft parts and shell which is characteristic of terrapins. Therefore, Gaffney and Meylan (1988) placed *Deirochelys*, along with the subtribe Nectemydina (*sensu* Smith and Smith, 1980), in its own subfamily, the Deirochelyinae.

If claw vibration does indeed occur as part of the courtship of male *Deirochelys*, this would also provide evidence for a close relationship to the subtribe Nectemydina.

The genus *Pseudemys* has developed a unique variant of this behavior

A modified courtship position occurs exclusively in males of the genus *Pseudemys* (Figure 2). The male *Pseudemys* swims in the same direction above the female whereas in all other species the male faces the female during claw vibration. This courtship position is therefore a synapomorphy of the genus *Pseudemys* and distinguishes it from all other related genera (see Figure 1).

The German terrarium fancier Gerhard Krefft (1950) may be credited as the first to point out the value of using courtship characters in taxonomy above the species level in the turtles now classified in the genera *Chrysemys, Pseudemys* and *Trachemys*. Also to his credit, Krefft correctly proposed that the courtship position of *Pseudemys* is derived from the ancestral courtship in *Chrysemys picta* and *Trachemys scripta*. As he

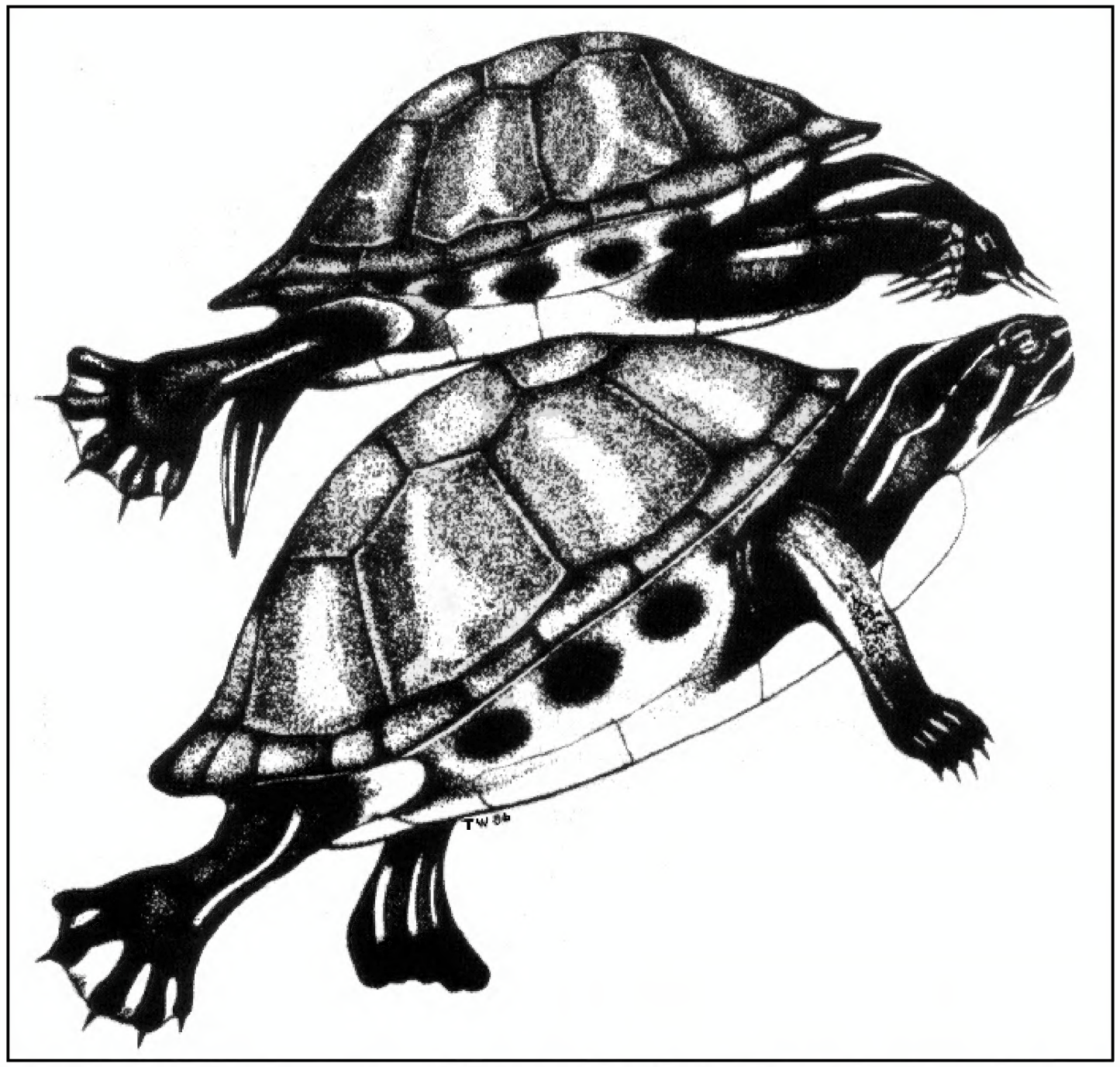


Figure 2. *Pseudemys nelsoni* in the courtship position characteristic of the genus *Pseudemys*. — From Kramer and Fritz (1989).

noted, this derived courtship "is characteristic of the *floridana Rassenkreis* [complex]" (now *Pseudemys concinna*, *P. floridana* and *P. texana*, thus a part of the genus *Pseudemys* as now defined).

Is head-nodding in the courtship display of many chelonian species of taxonomic relevance above the species level?

When considering the value of behavioral characters in systematics, one encounters the same problems that are present in the use of morphological criteria: that is, the danger that one will misidentify convergent characters as homologies, and thereby draw the wrong conclusions regarding relatedness, increases with increasing kinship distances of the taxa studied.

Accordingly, at lower taxonomic levels it is highly probable that inherited behavior patterns with complex, identical motion patterns will indeed represent homologies [characters of common origin]. However, this sort of generalization is quite risky at higher taxonomic levels.

Head-nodding is known to be an important element of courtship in nearly all taxonomic groups within the order Testudines (see Appendix; and Carpenter and Ferguson, 1977). In the first part of this study (Fritz, 1990), it was also described for the first time for a species of the genus *Trachemys*. Head-nodding is therefore a plesiomorphic [ancestral] character for the Nectemydina species and not useful for investigating their systematics. Because head-nodding also occurs in squamates (Carpenter and Ferguson, 1977), it is even possible that this behavior is a common heritage of several reptile groups and therefore a plesiomorphic character for the chelonians as a whole.

The courtship within the subtribe Nectemydina exhibits manifold variations of the same primary types

Hence, the motion pattern of head-nodding in the courtship of certain terrapins does not allow one to draw any direct conclusions regarding their taxonomic relationships to other turtle species. However, despite this, it does allow for some interesting statements on the evolution of courtship in the different genera of the Nectemydina.

In the courtship of *Graptemys* and *Malaclemys* species, the characteristic claw vibration behavior occurs either alone or in combination with head-nodding motions, or head-nodding occurs alone (see Appendix). *Graptemys* and *Malaclemys* together probably comprise the sister group of *Trachemys* (Seidel and Smith, 1986; see also Figure 1). Therefore the head-nodding behaviors of *Graptemys, Malaclemys* and *Trachemys ornata* are most probably homologies.

The southeastern United States is regarded as the Pleistocene radiation center of *Trachemys* (Barbour and Carr, 1940; Auffenberg and Milstead, 1965; Seidel, 1988), and is probably

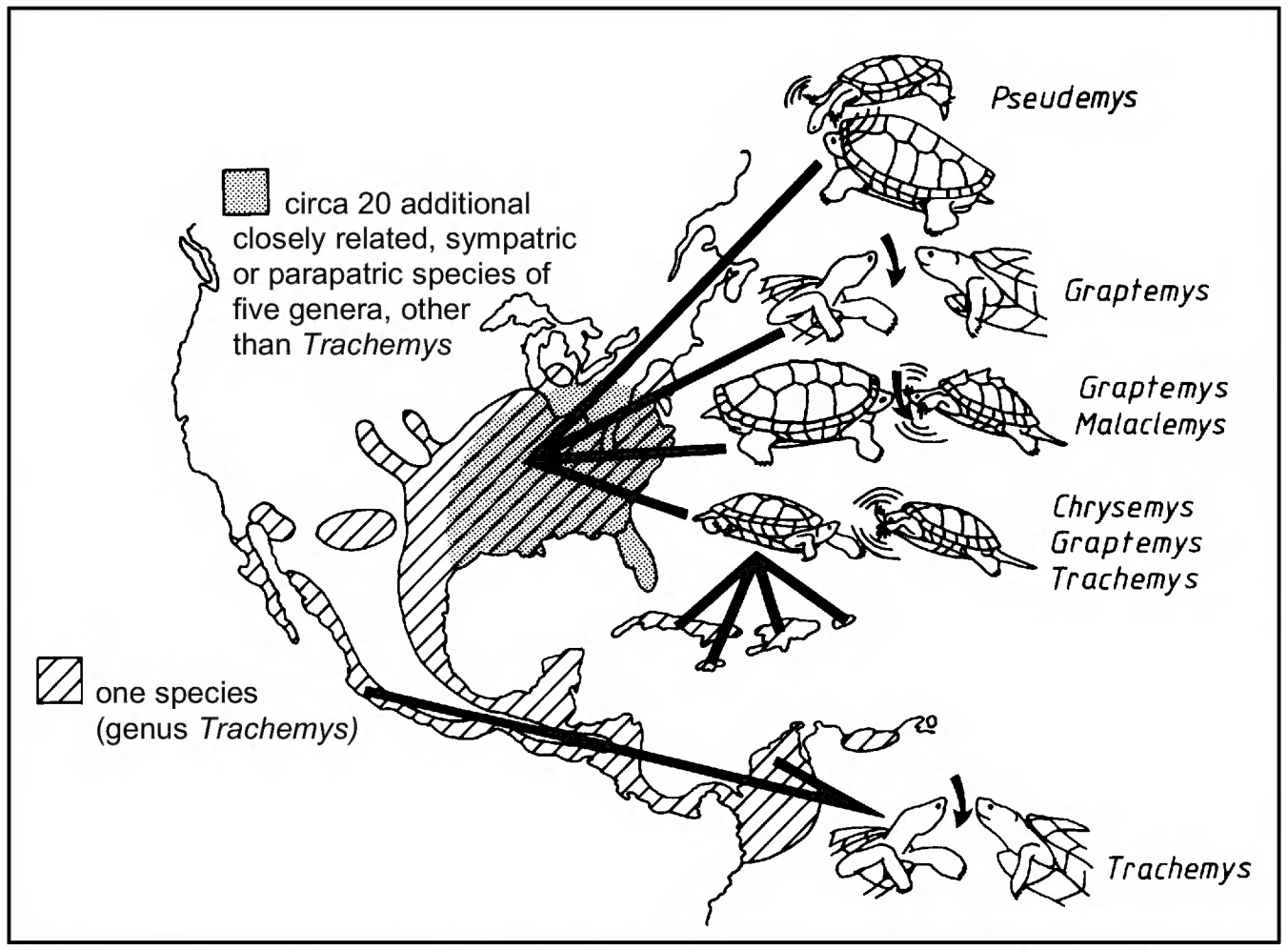


Figure 3. Diversity of courtship patterns of the subtribe Nectemydina corresponding to the number of sympatric species. The region with the highest species diversity is the southeastern United States. Several variants of the same primary courtship pattern developed in this area by character displacement. In a similar manner, at least two courtship modes of the parapatric *Trachemys* species may have evolved.

also the Pleistocene radiation center of the whole subtribe Nectemydina. The present, highly overlapping distribution patterns of the different nectemydine genera and of *Deirochelys* in this geographic area (see maps in Conant, 1975; and Figure 3) and the extensive similarities of the different behavior elements among these closely related taxa allow one to conclude that a common ancestral behavior pattern existed and that a species-specific differentiation (character displacement) occurred during speciation. It is exactly in the radiation center of *Trachemys*, which is presently the region with the highest species density (circa 20 sympatric and parapatric, closely related species in five genera, excluding *Deirochelys*), that one finds the greatest diversity of different courtship elements (Figure 3). This high number of species must require highly effective isolating mechanisms to maintain the genetic independence and the diversity of the different taxa. The motion patterns displayed during courtship surely have a great importance as isolating mechanism.

The ancestral courtship of the subtribe Nectemydina must have been composed of both motion patterns, head-nodding and claw vibration

The widespread occurrence of head-nodding movements and of claw vibration in the courtship of these species (see Appendix) implies that the ancestral courtship consisted of both motion patterns. At present, a courtship behavior consisting of both of these distinct behaviors is found in *Malaclemys* and in some *Graptemys* species (see Appendix). Claw vibration alone presently occurs in some of the *Graptemys* species; in the sympatric *Chrysemys, Pseudemys*, and *Trachemys* species (of North America); and in the West Indian *Trachemys*. However, in the parapatric or allopatric *T. ornata* and in *G. geographica, G. pulchra*, and *G. versa*, only head-nodding has survived.

How is the information about the species identity of the courting male encoded in the courtship?

The two ancestral nectemydine behavior patterns, head-nodding and claw vibration, may be exhibited separately or together; thus, alone they comprise three different behaviors which may encode the species identity of the courting male for the courted female.

In all species of the subtribe Nectemydina, one of these three variants occurs (see Appendix). In the parapatric or allopatric *Trachemys scripta* and *T. ornata*, two different behaviors occur as a form of character displacement. The same is true for some sympatric species pairs.

In addition to these primary behavior patterns, there seems to exist a diversity of species-specific variations of behaviors which are poorly understood and have been little studied. Moreover, these variations may occur in combination. Through this variation, the potential number of different behavior patterns is increased. These additional differences in male courtship pattern may function as isolating mechanisms, and are briefly listed as follows:

1) Different courtship positions: from above, and in the same direction as the female (genus *Pseudemys*: Jackson and Davis, 1972b; White and Curtsinger, 1986; Kramer and Fritz, 1989; Fritz, 1989) compared to a frontal position during claw vibration (all other genera of the subtribe Nectemydina: see Appendix for literature citations).

2) Species-specific differences in the duration of the claw vibrations (recorded for *Trachemys scripta elegans* and *Pseudemys concinna*: Jackson and Davis, 1972a, b).

3) Species-specific differences in the vibration frequency of the claws [within a motion pattern] (recorded for *Chrysemys picta*: Ernst, 1971; and *Pseudemys nelsoni*: Kramer and Fritz, 1989).

4) Species-specific differences in the repetition frequency of displayed claw vibrations [within a courtship behavior sequence] (recorded for *Graptemys pseudogeographica* and *G. ouachitensis*: Vogt, 1978).

Moreover, Ernst (1971) notes for *Chrysemys picta* that the receptive female will respond to the claw vibrations of the courting male with an identical behavior, but with a slower vibration frequency, which is followed by copulation. Perhaps this active participation of the female plays an important role in the selection of the sexual partner because such participation during courtship is probably unique within the subtribe Nectemydina. However, during two years of observations of the courtship of two males and one female of *C. picta bellii*, I never observed claw vibration by the female as a response to a courting male. On the other hand it is known that female terrapins sometimes display behaviors similar to the courtship of the males in other behavioral contexts (see for example, Kramer and Fritz, 1989; Fritz, 1990). Therefore, it appears that more evidence is needed to ensure that the observations by Ernst were not misinterpreted.

In summary, more investigations are urgently needed, especially to determine what "cues" function as isolating mechanisms in the courtship of chelonians.

Acknowledgments

Thanks go to the following ladies and gentlemen who contributed to the success of this study: Prof. Dr. H. Rahmann (Institut für Zoologie, Universität Hohenheim) for his continuous support and encouraging of my interests, especially for allowing me to research on the biology of chelonians at the Institute of Zoology at the University of Stuttgart-Hohenheim; Dr. E. Zimmermann (Konstanz) for valuable technical advice; Mr. M. Reimann (Braunweiler) for supplying some Colombian sliders for observations; Mr. Peter Grossmann (Berlin) for some Mexican sliders; Prof. H. M. Smith (Department of Environmental, Population and Organismic Biology, University of Colorado–Boulder), Prof. D. Chiszar (Department of Psychology, University of Colorado–Boulder), Dr. W. Kästle (München) and F. J. Obst (Staatliches Museum für Tierkunde Dresden) for their helpful remarks and suggestions upon a manuscript of this study; Dr. A. Schlüter (Staatliches Museum für Naturkunde Stuttgart) and his predecessor, Dr. H. Wermuth, for access to the library of the Museum für Naturkunde, support in literature search and helpful advice; Mr. H.-J. Rummler and Mr. T. Wischuf for their help with the care of the sliders at the Zoological Institute Hohenheim. Special thanks go to my parents and to my wife Meta, who share their life not only with me but also with many tetrapod, armored and unarmored tenants, and who cared for these animals during my research trips. In addition, Meta Bollinger-Fritz assisted during analysis of videorecorded behaviors of Colombian sliders.

Literature Cited

Auffenberg, W., and W. W. Milstead. 1965. Reptiles in the quaternary of North America. Pp. 557-568. *In*: H. E. Wright and D. G. Frey, editors, The Quaternary of the United States. Lincoln: Princeton Univ. Press

Barbour, T., and A. F. Carr. 1940. Antillean terrapins. Mem. Mus. Comp. Zool., Cambridge, 54:379-417.

Bels, V. 1983. Analyse de la parade de *Pelomedusa subrufa* (Lacépède). Amphibia–Reptilia 4(2-4):297-309.

Bramble, D. M. 1974. Emydid shell kinesis: Biomechanics and evolution. Copeia 1974(3):707-727.

Carpenter, C. C., and G. W. Ferguson. 1977. Variation and evolution of stereotyped behavior in reptiles. Pp. 335-554. *In*: C. Gans and D. W. Tinkle, editors, Biology of the Reptilia, Vol. 7., Ecology and Behaviour A. London: Academic Press.

Conant, R. 1975. A field guide to reptiles and amphibians of eastern and central North America. 2nd ed. Boston: Houghton Mifflin Co.

Duda, P. L., and V. K. Gupta. 1981. Courtship and mating behaviour in the Indian soft shell turtle, *Lissemys punctata punctata*. Proc. Indian Acad. Sci. (Anim. Sci.) 90:453-461.

Ernst, C. H. 1971. Observations of the painted turtle, *Chrysemys picta*. J. Herpetology 5(3/4):216-220.

Ernst, C. H., and R. W. Barbour. 1989. Turtles of the world. Washington: Smithsonian Inst. Press.

Frair, W. 1982. Serological studies of *Emys*, *Emydoidea* and some other testudinid turtles. Copeia 1982(4):976-978.

Fritz, U. 1989. Beitrag zur Kenntnis der Texas-Schmuckschildkröte (*Pseudemys texana* Baur, 1893), (Reptilia, Testudines, Emydidae). Sauria 11(1):9-14.

————. 1990. Balzverhalten und Systematik in der Subtribus Nectemydina, 1. Die Gattung *Trachemys*, besonders *Trachemys scripta callirostris* (Gray, 1855). Salamandra 26(4):221-245.

Fritz, U., and D. Jauch. 1989. Haltung, Balzverhalten und Nachzucht von Parkers Schlangenhalsschildkröte, *Chelodina parkeri* (Testudines: Chelidae). Salamandra 25(1):1-13.

Gaffney, E. S., and P. A. Meylan. 1988. A phylogeny of turtles. Pp. 157-219. *In*: M. J. Benton, editor, The phylogeny and classification of the tetrapods, Vol. I. Oxford: Clarendon Press.

Hidalgo, H. 1982. Courtship and mating behavior in *Rhinoclemmys pulcherrima incisa* (Testudines: Emydidae). Transact. Kansas Acad. Sci. 85:82-95.

Jackson, C. G., and J. D. Davis. 1972a. A quantitative study of the courtship display behavior of the red-eared turtle, *Chrysemys scripta elegans* (Wied). Herpetologica 28(1):58-64.

Jackson, C. G., and J. D. Davis. 1972b. Courtship display behavior of *Chrysemys concinna suwanniensis*. Copeia 1972(2):385-387.

Jackson, D. R. 1978. Evolution and fossil record of the chicken turtle *Deirochelys*, with a re-evaluation of the genus. Tulane Stud. Zool. Bot.20:35-55.

Kirsche, W. 1971. Zur Pflege und Zucht der Steppenschildkröte, *Testudo horsfieldii* Gray. Aquar-Terrar. 18:84-86, 118-120, 158-160, 198-200.

Kramer, M., and U. Fritz. 1989. Courtship of the turtle, *Pseudemys nelsoni*. J. Herpetology 23(1):84-86.

Krefft, G. 1950. Das geschlechtliche Verhalten männlicher Schmuckschildkröten und seine Bedeutung für die Taxonomie. Bl. Terrarienk. 55:309-313.

————. 1951. *Deirochelys reticularia* (Latreille), eine wenig bekannte Schmuckschildkröte der USA. Aquar.- u. Terrar.-Z. 4(6):157-160.

Lehmann, H. 1988. Beobachtungen bei einer ersten Nachzucht von *Platemys spixii* (Duméril and Bibron, 1835), (Testudines: Chelidae). Salamandra 24(1):1-6.

Loveridge, A., and E. E. Williams. 1957. Revision of the African tortoises and turtles of the suborder Cryptodira. Bull. Mus. Comp. Zool. 115(6):160-558.

Mayr, E. 1975. Grundlagen der zoologischen Systematik. Hamburg and Berlin: Parey.

McDowell, S. B. 1964. Partition of the genus *Clemmys* and related problems in the taxonomy of the aquatic Testudinidae. Proc. Zool. Soc. London 143(2):239-279.

McKeown, S., J. O. Juvik and D. E. Meier. 1982. Observations on the reproductive biology of the land tortoises *Geochelone emys* and *Geochelone yniphora* in the Honolulu Zoo. Zoo Biol. 1: 223-235.

Murphy, J. B., and W. E. Lamoreaux. 1978. Mating behavior in three Australian chelid turtles (Testudines: Pleurodira: Chelidae). Herpetologica 34(4):398-405.

Obst, F. J. 1985. Schmuckschildkröten. Die Gattung *Chrysemys*. Wittenberg-Lutherstadt (Ziemsen), Neue Brehm Bücherei 549.

Rödel, M.-O. 1985. Zum Verhalten von *Sacalia bealei* (Gray), (Testudines, Emydidae). Salamandra 21:123-131.

Sachsse, W. 1984. Long term studies of the reproduction of *Malaclemys terrapin centrata*. Acta Zool. Pathol. Antverp. 78(1):297-308.

Seidel, M. E. 1988. Revision of the West Indian emydid turtles (Testudines). Amer. Mus. Novit. 2918:1-41.

Seidel, M. E., and M. D. Adkins 1989. Variation in turtle myoglobins (subfamily Emydinae: Testudines) examined by isoelectric focusing. Comp. Biochem. Physiol. 94B(3):569-571.

Seidel, M. E., and H. M. Smith. 1986. *Chrysemys*, *Pseudemys*, *Trachemys* (Testudines: Emydidae): Did Agassiz have it right? Herpetologica 42(2):242-248.

Shealey, R. M. 1976. The natural history of the Alabama map turtle, *Graptemys pulchra* Baur, in Alabama. Bull. Florida St. Mus., Biol. Sci. 21:47-111.

Smith, H. M., and R. B. Smith. 1980. Synopsis of the herpetofauna of Mexico, Vol. VI, Guide to the Mexican turtles, Bibliographic addendum III. North Bennington, VT: John Johnson.

Vogt, R. C. 1978. Systematics and ecology of the false map turtle complex, *Graptemys pseudogeographica.* Dissertation, University of Wisconsin, Madison.

————. 1980. Natural history of the map turtles *Graptemys pseudogeographica* and *G. ouachitensis* in Wisconsin. Tulane Stud. Zool. Bot. 22:17-48.

White, C. P., and W. R. Curtsinger. 1986. Freshwater turtles—Designed for survival. Nat. Geogr. 169(1):40-59.

Zimmermann, H., and E. Zimmermann. 1988. Etho-Taxonomie und zoogeographische Artengruppenbildung bei Pfeilgiftfröschen (Anura: Dendrobatidae). Salamandra 24(2/3):125-160.

Appendix

Turtle taxa in which ritualized head-nodding and/or foreclaw vibration are present (+) or absent (–) as elements of courtship behavior. The symbol (*) indicates information from Carpenter and Ferguson (1977); see this reference for original citations.

Species	Behavior pattern		Source
	Foreclaw vibration	Head-nodding	
Suborder Cryptodira (Hidden-neck Turtles)			
Kinosternidae (Mud and Musk Turtles)			
Kinosternon bauri	–	+	(*)
Emydidae (Pond Turtles)			
Emydinae (New World and European Pond Turtles)			
Chrysemys picta	+	–	(*)
Deirochelys reticularia	+?	–	Krefft (1951)
Emys orbicularis	–	+	Fritz, unpubl. data
Graptemys barbouri	+	–	(*)
G. flavimaculata	+	–	Vogt (1978)
G. nigrinoda	+	+	Vogt (1978)
G. geographica	–	+	Vogt (1978, 1980)
G. o. ouachitensis	+	–	Vogt (1978, 1980)
G. o. sabinensis	+	–	Vogt (1978, 1980)
G. p. pseudogeographica	+	+	Vogt (1978, 1980)
G. p. kohni	+	+	Vogt (1978, 1980)
G. pulchra	–	+	Shealey (1976)
G. versa	–	+	Fritz, unpubl. data
Malaclemys terrapin centrata	+	+	Sachsse (1984)
Pseudemys concinna	+	–	(*)
P. floridana	+	–	White and Curtsinger (1986); Fritz, unpubl. data
P. nelsoni	+	–	Kramer and Fritz (1989)
P. texana	+	–	Fritz (1989)
Trachemys s. scripta	+	–	Fritz, unpubl. data
T. s. troostii	+	–	Fritz, unpubl. data
T. s. elegans	+	–	(*)
T. ornata ornata	–	+	Fritz (1990)
T. o. callirostris	–	+	Fritz (1990)
T. decorata	+	–	Seidel (1988)
T. decussata	+	–	Seidel (1988)
T. stejnegeri	+	–	Seidel (1988)
T. terrapen	+	–	Seidel (1988)

Species	Behavior pattern		Source
	Foreclaw vibration	**Head-nodding**	
Batagurinae (Old World Pond Turtles)			
Rhinoclemmys funerea	–	+	(*)
R. pulcherrima incisa	–	+	Hidalgo (1982)
R. rubida	–	+	Ernst and Barbour (1989)
Sacalia bealei	–	+	Rödel (1985)
Testudinidae (Tortoises)			
Agrionemys horsfieldii	–	+	Kirsche (1971)
Geochelone carbonaria	–	+	(*)
G. denticulata	–	+	(*)
G. elephantopus	–	+	(*)
Gopherus flavomarginatus	–	+	(*)
G. polyphemus	–	+	(*)
Indotestudo forstenii	–	+	(*)
Manouria emys	–	+	McKeown et al. (1982)
Testudo graeca	–	+	(*)
Xerobates agassizii	–	+	(*)
X. berlandieri	–	+	(*)
Trionychidae (Softshells)			
Lissemys punctata andersoni	–	+	Duda and Gupta (1981)
Suborder Pleurodira (Sideneck Turtles)			
Pelomedusidae (Helmeted and Tropical River Turtles)			
Pelomedusa subrufa	–	+	Bels (1983)
Chelidae (Snakeneck Turtles)			
Acanthochelys spixii	–	+	Lehmann (1988)
Chelodina expansa	–	+	Fritz, unpubl. data
C. parkeri	–	+	Fritz and Jauch (1989)
Emydura albertisii	–	+	Fritz, unpubl. data
E. macquarrii	–	+	Murphy and Lamoreaux (1978)
Elseya latisternum	–	+	Murphy and Lamoreaux (1978)
Phrynops hilarii	–	+	Fritz, unpubl. data

Bull. Chicago Herp. Soc. 34(5):137-138, 1999

Nest Site "Selection" and Red-eared Sliders (*Trachemys scripta elegans*)

John K. Tucker
Illinois Natural History Survey, Great Rivers Field Station
Long Term Resource Monitoring Program-Reach 26
4134 Alby Street
Alton, IL 62002

Nest site selection is an important aspect of turtle life-histories. Ample evidence exists that water potential can influence hatchling size in turtle species that lay flexible-shelled eggs (Packard et al., 1985; Ratterman and Ackerman, 1989; Cagle et al., 1993; Packard and Packard, 1997). Hatchlings from turtle eggs placed in relatively moist sites will be larger than those from drier sites. Moreover, nest site selection can influence sex ratio (Janzen, 1994). In some cases, nest site selection can strongly influence survivorship and especially for sea turtles (Whitmore and Dutton, 1985; Mortimer, 1990; Peters et al., 1994). Some turtles may compensate for effects of nest depth on nest temperatures (Bodie et al., 1996).

For the past few years I have had the opportunity to examine nest sites of many female red-eared sliders (*Trachemys scripta elegans*). For the most part these turtles place their nests well away from the backwater lakes of the Illinois River where most of the turtles that I study live (Tucker, 1997). The nest site location is critical in river environments because flooding is fatal for embryos if the flooding is of long enough duration or occurs at older embryonic ages (Tucker et al., 1997). Most females nest in open, sunny sites near ecotonal areas such as forest borders.

While most females nest in appropriate locations, some do not. Apparently nesting in these turtles is affected by human alteration in their habitats (Tucker and Filoramo, 1996). The purpose of this note is to illustrate an example of nest site selection gone wrong.

The example that I illustrate is a female that chose to nest on the gravel shoulder of Illinois Route 100. This particular nest was located just west of the boat launching area of Pere Marquette State Park. I have observed twenty-six other females nesting on this road's shoulder. The gravel is tightly packed and seems to the human observer to be a formidable obstacle to hole digging. Nonetheless, *Trachemys scripta* females are quite capable of digging a normally shaped nest cavity under such conditions. In this particular instance, the turtle (221 mm plastron length) had completed the nest cavity (Figure 1) but had not yet laid eggs when she was interrupted. The frothy piles of mixed gravel, urine, and soil can be seen bordering the entrance to the nest cavity (Figure 2).

Nests in these locations have little chance for successful incubation. In nearly all cases that I examined, completed nests contained one or more broken eggs. The egg manipulation that females do during egg-laying apparently results in the broken eggs. The gravel that lines the nest cavity is sharp and cuts through the egg shells.

Turtles that select these sites appear to do so because the sites are elevated and exposed to open sun. Fortunately, relatively few turtles that I examined chose such sites. Regardless, gravel road shoulders are another hazard that nesting turtles have to contend with.

Figure 1. Female red-eared slider (*Trachemys scripta elegans*) nesting on the gravel shoulder of Illinois Route 100 near Pere Marquette State Park in Jersey County, Illinois.

Figure 2. Close-up of nest after the female was removed. Note the entrance into the nest cavity and on either side of it, the two piles of gravel and soil mixed with urine that would eventually have gone back into the nest cavity.

Literature Cited

Bodie, J. R., K. R. Smith and V. J. Burke. 1996. A comparison of diel nest temperature and nest site selection for two sympatric species of freshwater turtles. Amer. Midl. Natur. 136:181-186.

Cagle, K. D., G. C. Packard, K. Miller and M. J. Packard. 1993. Effects of the microclimate in natural nests on development of embryonic painted turtles, *Chrysemys picta*. Funct. Ecol. 7:653-660.

Janzen, F. J. 1994. Vegetational cover predicts the sex ratio of hatchling turtles in natural nests. Ecology 75:1593-1599.

Mortimer, J. A. 1990. The influence of beach sand characteristics on the nesting behavior and clutch survival of green turtles (*Chelonia mydas*). Copeia 1990:802-817.

Packard, G. C., and M. J. Packard. 1997. Type of soil affects survival by overwintering hatchlings of the painted turtle. J. Therm. Biol. 22:53-58.

Packard, G. C., G. L. Paukstis, T. J. Boardman and W. H. N. Gutzke. 1985. Daily and seasonal variation in hydric conditions and temperature inside nests of common snapping turtles (*Chelydra serpentina*). Can. J. Zool. 63:2422-2429.

Peters, A., K. J. F. Verhoeven and H. Strijbosch. 1994. Hatching and emergence in the Turkish Mediterranean loggerhead turtle, *Caretta caretta*: Natural causes for egg and hatchling failure. Herpetologica 50:369-373.

Ratterman, R. J., and R. A. Ackerman. 1989. The water exchange and hydric microclimate of painted turtle (*Chrysemys picta*) eggs incubating in field nests. Physiol. Zool. 62:1059-1079.

Tucker, J. K. 1997. Natural history notes on nesting, nests, and hatchling emergence in the red-eared slider turtle, *Trachemys scripta elegans* in west-central Illinois. Illinois Nat. Hist. Surv. Biol. Notes 140:1-13.

Tucker, J. K., and N. I. Filoramo. 1996. Fences and nesting red-eared slider turtles. Bull. Chicago Herp. Soc. 31:218-219.

Tucker, J. K., F. J. Janzen and G. L. Paukstis. 1997. Response of embryos of the red-eared turtle (*Trachemys scripta elegans*) to experimental exposure to water-saturated substrates. Chelonian Conserv. Biol. 2:345-351.

Whitmore, C. P., and P. H. Dutton. 1985. Infertility, embryonic mortality and nest-site selection in leatherback and green sea turtles in Suriname. Biol. Conserv. 34:251-272.

Bull. Chicago Herp. Soc. 34(5):138-139, 1999

Book Review: *Proceedings of the EMYS Symposium Dresden 96* edited by Uwe Fritz, Ulrich Joger, Richard Podloucky and Jean Servan (language editor, James R. Buskirk). 1998. Mertensiella 10 (Deutsche Gesellschaft für Herpetologie und Terrarienkunde). 302 pp. Softcover. DM 59.80 (approx US $30)*, half price for DGHT members. ISBN 3-9801929-9-7.

J. Alan Holman
Michigan State University Museum
East Lansing, MI 48824-1045
E-mail: holman@pilot.msu.edu

This volume grew from a symposium on *Emys orbicularis* attended by 62 participants at the Staatliches Museum für Tierkunde, Dresden, Germany, on 4–6 October 1996. The book is a significant contribution to the knowledge of the evolution, zoogeography, ecology, and conservation of *Emys* and a fine contribution to herpetology in general. The work consists of a collection of 28 papers and seven short notes.

Emys orbicularis is a compellingly interesting species; it is the only recent Old World member of the Emydinae (or Emydidae, sensu Gaffney and Meylan, 1988), has a very wide Palearctic distribution, and consists of six distinct subspecies groups and 13 recognized subspecies. Some populations are composed of large individuals and superficially resemble the North American *Emydoidea blandingii*. The species is basically intolerant of pollution and other environmental disturbances and is in trouble in many places. Moreover, its coexistence with the introduced *Trachemys scripta elegans* is a concern.

The book begins with a thorough introduction to the zoogeographic distribution and subspecific differentiation in *E. orbicularis* by U. Fritz, who emphasizes that ancestral *Emys* reached the Old World from North America in the late Paleogene or early Neogene and radiated into subspecies from East Asia to the West. The fossil record bears this out.

A combined paleontological and archaeological study by M. Cheylan demonstrates that *E. orbicularis* populations have

---

* Available to U.S. readers from Chimaira Booksellers, Friedberger Anlage 14, 60316 Frankfurt am Main, Germany, E-mail: <frogbook@aol.com>.

suffered from human predation and disturbance in the French Mediterranean area since late Pleistocene time. The study is documented by material from many late Pleistocene and Holocene sites. One would assume that this was probably the situation all over Europe.

A contribution from P. Lenk et al. on phylogenetic patterns in the mitochondrial cytochrome b gene, indicates that *E. orbicularis* expanded its range from refugia in the Mediterranean area during the postglacial period. The putative glacial refugia were in southwestern Europe, Italy, the Balkans, and the Ponticum.

That subspecies of *E. orbicularis* are still being described and will probably continue to be recognized is indicated by a study by U. Fritz et al. on the morphology of populations of *E. orbicularis* in the Anatolia area and the description of a new subspecies (*E. o. eiselti*) from southeastern Turkey. A morphological study by B. Farkas et al. compares populations of *E. orbicularis* from northeastern Germany, Poland and lowland Hungary. Results indicate the German and Polish populations are more similar to one another than the Hungarian ones, contradicting previous molecular studies.

A study on "imminent competition" between introduced populations of *Trachemys scripta elegans* and *E. orbicularis* in France by C. Arvy and J. Servan indicates that *T. scripta* is rather widely distributed and that some successful reproduction has occurred. A literature search indicated to them that there is a wide overlap of ecological niches in the two species. Obviously, further studies are needed to demonstrate the actual competitive impact of populations of *T. scripta* on *E. orbicularis*.

A contribution by M. Cheylan and F. Poitevin, dealing with the impact of fire on a population of *E. orbicularis* in southeastern France, provides specific data on the nature of the impact. They suggest that a fire periodicity of less than 20 years severely threatens population survival.

Emys orbicularis and *Testudo graeca* were the first turtles in which TSD was demonstrated in 1971. Now C. Pieau has shown by means of experiments in the field in central France that sex determination in *E. orbicularis* depends on the proportion of development exposed to masculinizing or feminizing temperature during a specific thermosensitive period. But more importantly, the author suggests a mechanism for TSD. This involves possible thermosensitive regulation of the transcription of the aromatase gene in the gonads. Aromatase is the enzyme that converts androgens to estrogens!

Papers on the reproduction and nesting of *E. orbicularis* in northeastern Germany, and eastern and central Poland are of interest as northern populations are usually less dense than the southern ones in Europe. B. Andreas and R. Paul found a clutch of eggs in Brandenburg (NE Germany) where dead hatchlings were arranged in an upright position in the breeding chamber (nest) such as occurs in hatchlings of *Chrysemys picta* that hibernate in the nest. This is the first record of this phenomenon in *E. orbicularis*.

Several papers deal with studies of the status and the suggested protocol for the maintenance and/or recovery of local populations. These include studies in northeastern and southwestern Spain; Mediterranean and central France; Abruzzo, Italy; northeastern and northwestern Germany; and European Russia. Other papers and notes deal with small regional populations, morphological comparisons of populations, subspecific identity of populations, and whether or not *E. orbicularis* is native on Majorca and in southwestern Germany.

The illustrations, charts, graphs, photographs and other figures in the book are excellent to good. The articles are all in well-written English. The articles are arranged in the text alphabetically by author rather than by subject matter, which is slightly disconcerting. This volume is without doubt the state of the art contribution to the knowledge of *Emys orbicularis* and should be part of the reference collection of every herpetologist. The reasonable price should make the book available to everyone.

Literature Cited

Gaffney, E. F., and P. A. Meylan. 1988. A phylogeny of turtles. Pp. 157-219. *In*: M. Benton, editor, The phylogeny and classification of the tetrapods, Vol. 1: Amphibians, reptiles, birds. Oxford (Syst. Ass. Spec. Vol., 35A).

Bull. Chicago Herp. Soc. 34(5):140-142, 1999

HerPET-POURRI

by Ellin Beltz

Quote of the month

"Everything is perfect, but there is a lot of room for improvement. Shunryu Suzuki." [from Karen Furnwegerl

Web wrigglers

Thanks to James N. Stuart, Lisa Koester, Gary Casper, Allen Salzberg, Gideon Ben Lachman, Philip Thomas, Jim Hatfield, Paul Sereno, Gabrielle Lyon, and Andrew Holycross for sending the following web addresses!

- The latest herp articles
  http://www.herplit.com/contents
- International Herp Websites Directory, including medical herpetology

  http://www.xmission.com/~gastown/herpmed/
- Common and Scientific Names for North American Herps
  http://eagle.cc.ukans.edu/ -cnaar/
- John Iverson's Turtles of the World checklist with maps, lists etc.
  http://bufo.geo.orst.edu/turtle/
- Crocs, Tuatara, and Turtle Species of World checklist
  http://www.flmnh.ufl.edu/natsci/herpetology/turtcroclist/
- North American Reporting Center for Amphibian Malformations (NARCAM); includes ID guide for species, maps of states with deformities
  http://www.npwrc.usgs.gov/narcam/
- Reptile and Amphibian Conservation site
  http://www.flmnh.ufl.edu/arc/
- CNN reports on three-headed turtle
  http://cnn.com/WORLD/asiapcf/9901/27/fringe/3.headed.turtle/
- Wisconsin Herpetology Homepage
  http://www.mpm.edu/collect/vertzo/herp/atlas/welcome.html
- The WTO Shrimp/Turtle Case—Deborah Crouse
  http://www.seaturtle.org/mtn/archives/mtn83/mtn83pl.shtml
- Green Iguana Ultimate Owner's Resources
  http://www.iguana.com
- Chihuahuan Desert herps
  http://horizon.nmsu.edu/ddl/
- Pesticides and frogs
  http://www.abcnews.com/sections/science/DailyNews/frogs981106.html
- Defenders of Wildlife news archives include many frog stories
  http://www.defenders.org/grnhome.html
- Frogwatch USA website
  http://www.mp2-pwrc.usgs.gov/frogwatch/
- Hawaii's alien frogs
  http://www.hear.org/frogs
- Dinosaur discovery at the Chicago Children's Museum
  http://www.chichildrensmuseum.org
- Dinosaurs of the Sahara at National Geographic Magazine
  http://www.nationalgeographic.com/dinorama/spino.html
- University of California Museum of Paleontology
  http://www.ucmp.berkeley.edu
- Project Exploration
  http://dinosaur.uchicago.edu

Letters needed now

"A bill has been entered into the 1999 Louisiana legislature to prohibit the commercial harvest of wild box turtles, regulate the taking of wild box turtles for noncommercial purposes and provide for penalties. The bill is Senate Bill SB937 . . . sponsored by state senator Robert J. Barham [who] is considered as a moderate by his fellow legislators. The Louisiana Department of Wildlife and Fisheries may try to persuade Senator Barham to withdraw the bill. We need people to write or call Senator Robert J. Barham, thank him for introducing SB937 and tell him that the box turtle needs this protection now in order to survive. Also write or call Mr. Phil Bowman, Assistant Secretary of the Louisiana Department of Wildlife and Fisheries, and tell him that a sustained harvest of box turtles is not feasible. Addresses: Senator Robert J. Barham, P.O. Box 249, Rayville, LA 71269, Fax: (318) 728-3070. Mr. Phil Bowman, Assistant Secretary Louisiana Department of Wildlife and Fisheries, P.O. Box 98000, Baton Rouge, LA 70898-9000, E-mail: <bowman_pe@wlf.state.la.us>. We thank you for your help and assistance in preserving Louisiana's box turtles." Martha Ann Messinger and George M. Patton, fax 318-283-81 1 1, E-mail: <gpatton@bayou.com>. [forwarded by Allen Salzberg and James Harding, March 29, 1999]

It's cache food, not cash food.

A letter to the editor of the [New Orleans] *Times Picayune* discussed the death of "Pale Face," the white alligator at the Aquarium of the Americas mentioned in a previous column here. "It was not a freak accident where one coin was thrown in his tank by one visitor a volunteer did not stop. It was a conglomeration of a number of coins over a period of time that collected in the alligator's windpipe and choked him to death. He had about 30 coins in his stomach. The volunteers could not stop anyone from throwing coins into the exhibit because of its design. The exhibit at the Audubon Zoo for the white alligators is even worse. I saw visitors stand above the white alligators on the bridge of the exhibit and drop coins on them. . . . There are now only 17 leucistic white alligators in the world with none breeding. . . . Many volunteers have complained. . . . Let us hope that the Audubon [Zoo] protects the rare and endangered animals in their care in the future." Mark Houghton, New Orleans. [February 16, 1999, from Ernie Liner]

We're calling—are you listening?

• March 24, 1999, "Twain's frog in court: Earthjustice Legal Defense Fund and a coalition of groups announced they are suing to protect Mark Twain's infamous Jumping Frog of Calaveras County. The suit says the U.S. Fish and Wildlife Service failed to list critical habitat for the threatened California red-legged frog. EJLDF's [spokesperson] said, 'Since April 1996, the [agency] has not once designated critical habitat without being forced by the courts. This policy violates the law and is failing the frog in California.' Meanwhile, "The April 15 *Nature* reported scientists studying in Costa Rica's Monteverde Cloud Forest found a strong link between climate changes and amphibian extinctions. The report says changes caused by El Niño and the overall warming of ocean currents has led to reduced moisture in the cloud forest. This appears to have caused the disappearance of 20 frog species in Costa Rica. The *Billings Gazette*, April 19, highlighted frog declines in Yellowstone National Park. Populations are estiinated to be only a quarter of numbers counted in the 50s, with human impact and habitat destruction the likely cause. [*GREENLines*, April 2 and 21, 1999, from Roger Featherstone]

• At a conference hosted by the San Diego Zoological Society, amphibian researchers agreed that "reports of amphibian abnormalities have increased dramatically in recent years and that at some sites, for some species, the percentage of abnormalities is higher than would be expected. . . . The majority of limb abnormalities appear to occur during limb development in tadpoles and salamander larvae. . . . It is unlikely that there is any single common cause for the various types of abnormalities observed, and more than one factor may be operating at any given sites. . . . A formal consensus statement is being prepared. . . ." [Jamie K. Reaser, writing in *Froglog*, February 1999]

• With Australia reporting 10 species of frog disappeared and 15 more in decline and New Zealand having lost half its frog species (3/6), herpetologists down under are concerned. Like the rest of the world, many factors are at work. Pesticides, herbicides (including Roundup) and other chemicals may change soil and water chemistry to the point where frogs can no longer survive. Habitat fragmentation has been implicated in declines. However, a recent article in *Moko* pointed out some unusual causes of antipodean declines. *Rheobatrachus silos*, the gastric brooding frog, used to swallow its eggs and regurgitate them at hatching. The species was discovered in 1973 when large numbers were reported from a southeastern Australian rain forest. The frogs had disappeared totally by 1981 after continuous disturbance and scientific collecting as well as a series of dry summers and later than usual rains. Other non-native animals including rats, cats, dogs, cane toads, mosquito fish and others have assisted in the reduction of native frog populations. [Summer (our winter), 1998]

• "Police in the southern Czech region of Moravia closed a busy road to give local frogs safe passage to their mating areas. Traffic was diverted along a pond near the town of Brno, located 125 miles southeast of Prague, to protect the amorous amphibians from being killed by passing vehicles. Hundreds of frogs are killed in the Czech Republic each sprmg while migrating to mating areas. A special frog tunnel was opened in north Moravia last year to reduce the number of deaths." [*The Oregonian*, April 7, 1999, from Jim Hatfield]

Whining will get you nowhere

A business owner in Fishkill, New York, erected a half-inch-mesh, four-foot fence around part of his property. He said, "They're rattlesnakes. They're poisonous. They're deadly." The odd thing is that he's known about the snakes for a couple of years. The snakes are an issue in a permit application for stone mining on Sour Mountain. The businessman claims that the state is stalling him and casts the whole issue as jobs versus snakes. [March 18, 1999: *Albuquerque Journal* from J. N. Stuart and, from Ernie Liner *The Advocate* and *The Times-Picayune*] Read all about it at <http://www.cnn.com>. Type "rattlesnake" in their search box.

Bright snakes on web

Isn't it odd how keepers often anticipate research? We all knew our snakes were clever, but everybody else told us how dumb they were. Now comes neuroscientist David Holtzman who has found that snakes regenerate neurons in their brains essentially building new storage for new information. Previous researchers had put snakes in mazes—like rats—and found that they were unable to get out. (Keepers know that the snakes probably found a nice corner and went to sleep having no reason to waste calories moving around a safe, enclosed space.) What's new this time is that the test pit is a large open space with limited escape points. Only one of the holes is open at any time. Then (because it's science) there are the iterations. Put snake in pit. Scare the snake; watch it escape. Do it again. See if the snakes learn anything. And (no surprise to us at home!) they did. Your ophiophobe friends will be happy to know that the reason we "need" to know this is that humans don't build new neurons the way snakes do and it might be of great benefit to people with head injuries to be able to regrow lost brain cells. [Read all about it at <http://abcnews.go.com/sections/science/DyeHard/dye9903 10.html] New contributor Emily Forcade wrote: "David Holtsman's full report was published in the January *Animal Behavior*. . . . I'm new to the CHS and enjoy your column there and in *Vivarium* as well."

Micro-metapopulation dynamics

Recently I was told of a fascinating teaching exercise to illustrate metapopulation dynamics for primary school children. Natural populations of amphibians grow and flourish in ponds which may or may not be a good long-term site. What is often seen is that one pond supports the population in times when other ponds are reduced or eliminated. Russ Hendricks of the Lake County Forest Preserve District used these concepts in a recent primary program by having the children pretend to be frogs. He divided them into a permanent pond population and temporary pond populations. As the temporary ponds dried up, the "frogs" were forced to seek new habitat in other temporary ponds or in the permanent pond. After they'd been hopping for a while, he told them that a major fast-food chain had just built a restaurant on their permanent pond. The

"frogs" were forced to live only in temporary ponds. Random events then pinched out these ponds one by one—leaving the "frogs" nowhere to turn. Congratulations, Russ on a fantastic program—and one I think I'll swipe for my college classes!

New Zealand News

From the other down under comes news of a total change in management at the New Zealand Herpetological Society as a new group of directors takes over all the positions in the society and continues the fine traditions of the society's newsletter *Moko*. In this issue are stories about herps and herp people on the islands. Perhaps my favorite was about a volunteer discovering a rare black-eyed gecko hundreds of kilometers from its only known habitat. Also more than 300 rare Maud Island frogs were transferred from island to island in the Marlborough Sound in an effort to preserve the species. The transferred frogs bred, as juveniles were discovered this year. New Zealand frogs are considered some of the most primitive living frogs. You can subscribe: Write them at NZ Herpetological Society, P.O. Box 6046 Moturoa-New Plymouth, New Zealand or E-mail: <ngairej@taranaki.co.nz>. The cost is 40 dollars New Zealand for overseas members.

It's gonna be a long, hot summer

• An 11-foot python was seized by Champaign, Illinois, police after his owner decided to take him outside for a walk on a nice day in January. The city has an ordinance against large snakes and the snake was also over the limit imposed by the Illinois Dangerous Animals Act. [*News-Gazette*, January 29, 1999] Contributor David Blatchford writes: "It's amazing the effect snakes can have even on the most phlegmatic official. We were recently on holiday in Plymouth (the one in Devon, England) and heard of a corn snake that vanished whilst being washed in the bath. The ex-owners phoned police who toured the streets broadcasting through a megaphone warning people that the snake had infested the sewage system and could pop up through a toilet when they least expect it. Apparently the notion that reptiles are obsessed with the sewage system and consider it an ideal domicile is still popular. The theory being that the corn snake had realized from its low vantage point in the bath that a toilet—entry into the enchanted kingdom—was just a slithery porcelain crawl away and at the first opportunity had hurled itself into the malodorous and very chilly depths. Reason—like the snake—just vanished 'round the bend. . . . Keep up the good work." The clipping actually crossed the Atlantic twice; it was sent to David in Scotland by a friend in Illinois—then mailed to me! Curiously, no U.S. member sent me a copy of this story.

• If you're passing through Ontario, Canada, this summer, plan a visit to the Indian River Zoo. Over 200 reptiles and amphibians are on exhibit including "Canada's Largest Rattlesnake Exhibit," "Live Demonstrations," "Gator Feedings" and the "Serpentarium." Call (705) 639-1443 for more information. [from Wes von Papineäu]

• "A 7-foot-long, 175-pound alligator [sic] that was pushed out of its natural feeding grounds by development in Rio de Janeiro resorted to dining on local pets, authorities said. The ravenous reptile invaded a home near a swampy nature park . . . and gulped down the owner's dog along with four chickens that were in the yard. Four officers from Rio's environment patrol captured the alligator, tied it to a stretcher and took it to a zoo." [*Orlando Sentinel*, March 20, 1999, from Bill Burnett]

• A breeder of boas and pythons recently set the pole vault record at the USA Championships. His jump was 19 feet, 5 inches erasing the mark of 19 feet, 4 and 3/4 inches, he set at the last championship event. [*Albuquerque Journal*, February 28, 1999, from J. N. Stuart] We are left to wonder if he trains at home or in a gym.

• A lovely photo of a smiling gator on a concrete circle is captioned: "The gator is soaking up the sunshine . . . on the fountain fixture in the pond adjacent to the Delta Orlando Resort near Universal Studios Escape. Wildlife officials have been trying for some time to snare the gator which is about 5½ feet long and has been frequenting the pond since it was a baby. The rascally reptile manages to escape capture by slipping through the drainage pipes to a nearby retention pond. Maybe that's why it's smiling." [*Orlando Sentinel*, March 20, 1999, from Bill Burnett]

• A reptile trapper caught the four-foot monitor which had been terrorizing Tampa, Florida. The animal had lived under a house in a subdivision; the owners of the house saw it and feared to go outside. The trapper placed a live trap, baited it with chicken and finally caught it. The monitor is headed for a licensed reptile facility. [*Orlando Sentinel*, February 11, 1999, from Bill Burnett]

• The principal of an elementary school in Louisiana promised students that if they would read 650 books for the Read Across America celebration of Dr. Seuss's 95th birthday, she would kiss a pet iguana provided by one of the students. The kids read 843 books in three days, forcing the principal to pucker up. [*Times-Picayune*, March 6, 1999, from Ernie Liner]

Thanks to everyone who contributed this month and to Bill Montgomery, Marcia Rybak, Tom Taylor, Claus Sutor, Ray Boldt, Bill Burnett, Ernie Liner, J. N. Stuart and others who have sent clippings and letters which I will be using next month along with a full report from ReptileFest! You can contribute too. Just send whole pages of newspaper or clippings with date/publication slug firmly attached. Put your name on each piece (those freebie address labels work great) and mail to: Ellin Beltz, 1647 N. Clybourn Avenue, Chicago, IL 60614-5507. Letters and cool website addresses to my E-mail: <ebeltz@ripco.com>.

Bull. Chicago Herp. Soc. 34(5):143-144, 1999

Herpetology 1999

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

SIDEWINDING SEA SNAKES

H. Heatwole and P. Abbott [1998, Herpetofauna 28(2):14-15] visited Ilot Araignére, a tiny sand cay near Noumea, New Caledonia, on 30 June 1993 to collect venom of the banded sea krait, *Laticauda colubrina*. Twenty-four specimens were found together in a single cavity in the sand; no other snakes could be found on the island. The loose sand of the upper beach bore a series of parallel marks that had the characteristics of sidewinding tracks. These led from the area at which the snakes were located down toward the sea and were not seen anywhere else on the beach. There were at least 8 different sets of marks. The authors note that although this evidence provides the first indication of a laticaudid sidewinding, it is not the first record of an aquatic snake doing so. Sidewinding over mud and sand has been noted in several species of natricine and homalopsine snakes.

INTRODUCED SPECIES AND ISLAND ECOSYSTEMS

T. H. Fritts and G. H. Rodda [1998, Annu. Rev. Ecol. Syst. 29:113-140] note that the accidental introduction of the brown treesnake (*Boiga irregularis*) on Guam around 1950 induced a cascade of extirpations that may be unprecedented among historical extinction events in taxonomic scope and severity. Birds, bats and reptiles were affected, and by 1990 most forested areas on Guam retained only three native vertebrates, all of which were small lizards. Of the hypotheses to account for the severity of this extinction event, the authors found support for the importance of lack of coevolution between introduced predator and prey, availability of alternate prey, extraordinary predatory capabilities of the snake, and vulnerabilities of the Guam ecosystem. In addition, there were important interactions among these factors, especially the presence of introduced prey (possessing coevolutionary experience) that were thus able to maintain their populations and provide alternate prey to the introduced predator while it was driving the native prey species to extinction. This complex of vulnerabilities is common on oceanic islands.

NEW SPECIES OF RANID FROM ANDAMAN ISLAND

I. Das [1998, Hamadryad 23(1):41-49] describes a new species of ranid, tentatively assigned to the genus *Rana* (sensu Boulenger, 1920) from Mount Harriet National Park, South Andaman Island, India. The new species, *R. charlesdarwini*, is diagnosed by the following suite of characters: tympanum large, exposed; lingual papilla absent; digit tips swollen but not dilated, lacking circummarginal grooves; ova pigmented, relatively numerous; the single adult male known smaller than two adult females and shows a median vocal sac and smooth nuptial pads on upper surface of first finger. Its phytotelmonous larvae (inhabiting water-filled holes of trees) have robust, terminally-situated, dark-pigmented jaw sheaths.

ASP VIPER CONSERVATION

C. Jäggi and B. Baur [1999, Amphibia–Reptilia 20(1):25-34] note that in the northern Swiss Jura Mountains, the asp viper *Vipera aspis* was common until the 1940s. During the past 50 years many local populations went extinct and nowadays the species is considered as threatened. The authors compared habitat characteristics of localities with extant viper populations with those of localities where the species became extinct. These two groups of localities did not differ in exposure, altitude, inclination, soil structure and ground-cover vegetation. However, localities where the species is still found were situated more frequently at forest edges, in dry meadows and at roadsides, whereas localities in which *V. aspis* became extinct were situated more frequently in forests. Tree density was lower at localities where the viper is still present. The results suggest that former habitats of *V. aspis* became overgrown by bushes and trees, which in turn may have led to a colder, more humid and thus unfavorable microclimate for *V. aspis*. The authors conclude that logging is an essential tool to maintain suitable habitat for this thermophilous ovoviviparous reptile.

THERMAL ECOLOGY OF AN INDIAN TREEFROG

H. B. Lillywhite et al. [1998, J. Herpetology 32(2):169-175] reported previously that Indian treefrogs, *Polypedates maculatus*, periodically wipe themselves with mucus-borne lipids secreted from cutaneous mucous glands. When dried, these skin secretions decrease water loss but provide only modest resistance to cutaneous evaporation when compared with lipid barriers of so-called "waterproof" species of treefrogs. Aqueous mucous secretions also allow frogs to increase evaporative water loss when they are expelled repetitively during sweating. In *P. maculatus*, spontaneous sweating of mucous secretions was shown to begin at threshold body temperatures of approximately 30°C, compared with 39–40°C in the waterproof species. Here the authors report that Indian treefrogs voluntarily tolerate body temperatures in the range 28–38°C when they are normally hydrated and exposed to direct sunlight. In contrast, dehydrated treefrogs (approximately 16% of body mass) avoid direct sunlight when body temperatures increase above the 30°C threshold for sweating. Basking treefrogs respond to thermal stress by sweating, panting, and adopting lighter skin coloration, with the result that body temperatures are maintained 10–15°C lower than equilibrial temperatures of a dry model frog in sunlight. Both field and laboratory observations suggest that during periods of combined heat and drought, *P. maculatus* secludes itself in sheltered microenvironments where body temperature equilibrates below 30°C to avoid rapid losses of water to thermally induced sweating. This behavior contrasts with that of the "waterproof" anuran species, which remain more exposed and tolerate considerably higher body temperatures without sweating.

YELLOW-SPOTTED RIVER TURTLE NESTING

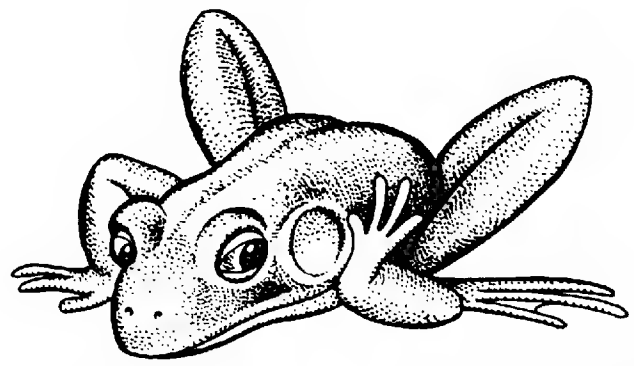
V. P. Páez and B. C. Bock [1998, Chelonian Cons. and Biol. 3(1):31-36] studied the nesting ecology of yellow-spotted river turtles, *Podocnemis unifilis*, over two years at a western Amazonian location that essentially lacks a dry season. Nest loss due to flooding over these two years would have been 64% had nests not been transferred to safer areas. Frequent rains during both nesting seasons contributed to low incubation temperatures and long nest incubation periods (from 67 to 82 days). Incubation of eggs in the laboratory confirmed the significant relationship between incubation temperature and incubation period observed in the field. Eggs incubated at temperatures varying from 27 to 32°C exhibited high hatching success rates, but with incubation periods which ranged from 104 to 48 days. Calculations based upon the regression of incubation temperature to incubation period suggest that most of the nests in this study would have hatched prior to the flooding of the beach in these two years had they experienced mean incubation temperatures of 31°C or more (temperature values typical of beaches from more seasonal parts of the range of this species). It is suggested that artificially elevating incubation temperatures of in situ nests might represent an alternative to transferring nests in areas where incubation temperatures are low and the risk of nest loss due to flooding also is high.

AN UNUSUAL DESERT TORTOISE POPULATION

A. M. McLuckie et al. [1999, J. Herpetology 33(1):36-44] note that under recent regulatory designation of the U.S. Fish and Wildlife Service, desert tortoises (*Gopherus agassizii*) occurring east and south of the Colorado River constitute the Sonoran population, whereas those to the west and north form the Mojave population. These management units, distinguished by significant genetic, morphometric, and ecological differences, represent deep phylogenetic subdivisions within *G. agassizii* and are of high conservation value. The authors provide genetic and morphological profiles for an unusual tortoise population inhabiting the Black Mountains of Arizona, some 40 km east of the Colorado River. Both mitochondrial (mt) DNA and morphometric analyses revealed predominately Mojavean features: 10 of 11 Black Mountain tortoises possessed Mojave mtDNA markers, and 24 of 37 animals exhibited Mojave morphometric phenotypes. These results indicate west-to-east movement of tortoises across the Colorado River, though how or when a Mojave lineage became established in the Black Mountains is difficult to ascertain. Active dispersal, river meander, and human transport (early or modern peoples) serve as plausible explanations. Future management of the Black Mountain tortoises should emphasize the population's Mojavean affinities.

Bull. Chicago Herp. Soc. 34(5):144, 1999

The Tympanum



May 1, 1999

Dear CHS Members and Board of Directors:

Please accept this letter as notice of my resignation as CHS Publication Secretary as of today.

I truly looked forward to serving you and appreciated all the positive feedback my proposed *Bulletin* additions (meeting notes, CHS events / husbandry calendar, media notes and the minor rearrangement of the *Bulletin* order (oddly, the main stumbling block)—so that the President's letter, your feedback (the Tympanum), and the minutes from our Board of Directors be placed in the front of the publication engendered. However, the contact I've had with those same members has made me come to realize that I am not truly the Publications Secretary, especially after the March issue of the *Bulletin*.

My tenure has been as if someone were to point at you and say, "You are responsible for the weather." From that point on you must answer for something which you have no control over. Frankly, it's not a pleasant situation to be in.

I have, in the past, served on CHS nominating committees, as Librarian and Picnic Coordinator and thoroughly enjoyed myself. The members are what makes a society and the CHS is no exception. As I have told the myriad number of folks that have contacted me over the past few months—make your feelings known. Follow the chain of command. Do not be afraid to approach your Board of Directors. The Society is a reflection in small of the larger world around it; treat it the same: petition and make your voices heard. I'm sorry I won't be in the thick of things with you, but admitting that you are ineffectual, several times a month, month after month is not my cup of tea.

Enjoy the Spring and coming year. Take advantage and appreciate your Board, especially its President—they have some great ideas! Become doers. You belong to the Society that puts on ReptileFest—a simply awesome event!! The zoo trips, Library, general meetings and educational workshops should all be utilized. There's no doubt in my mind that the CHS is a society others view with awe and its members are no small part. Be active—volunteer!

Thanks so much for reading.

Catch ya on the flipside.
Lisa Koester

Letter from the President

Dear Members:

I'm writing this letter nearly a week past ReptileFest and I am still exhausted from the weekend activities. What a great time was had by all who attended, volunteered, and exhibited! It was great to see some new members get in the muck of things by lending a hand, too. Talk about a CHS initiation! I want to thank Lori King and Gary Fogel on behalf of everyone for a tremendous job! Words cannot describe what the two of you put into this event. The Society is honored by the work put forth by Lori and Gary and without them, ReptileFest just would not be! Ready for next year?

For those who could not make it out, you missed some outstanding exhibits! Paul Sereno's and Gabrielle Lyon's "Project Exploration" exhibit was indeed a spectacle, with its five-foot-long dinosaur skull. The CHS was privileged to have had such distinguished guests. I have to especially acknowledge and thank Bob Bavirsha and his outstanding display. He drew very large crowds in constant steady streams and was holding court to wide-eyed kids of all ages with his critters. Bob was both very professional and entertaining and quite the crowd pleaser! Another bigtime crowd gatherer is of course, Jim Nesci with his alligator, Bubba. A CHS event would not be complete without Ol' Bubba! He was very well mannered as always and Jim was very informative to the curiosity seekers who were in awe of Bubba. I realize hauling around these magnificent beasts is no easy feat, and I want to personally thank them for making our fest a success! I don't get many opportunities to show off my uromastyx lizards as well and blab about them all day so I get great satisfaction in educating the public about them. What makes these fests so important is we get to meet people who may also be keeping the herps that we do and we get the opportunity to answer a lot of questions on husbandry as well as refute some myths! Maybe even save some herp lives in the process! Thanks to EVERYONE who hauled, hurled and hustled all weekend to make it happen once again!

A few other board members and I will be touring the new Chicago Academy of Sciences building soon and I will have details at the next general meeting. For those of you who do not know, the CAS will be our new home and general meeting place for Y2K and beyond.

The Louisville Zoo trip bus is over half filled. There are still seats available so please call me if you're interested. Details on back page.

On another CHS matter, Publications Secretary Lisa Koester is resigning her seat on the Board of Directors. This will be discussed at the next Board meeting and a new Publications Secretary will need to be appointed. Lisa is resigning for reasons she has stated in a letter addressed to the membership. I wish Lisa well and hope the future holds nothing but good and positive things for her. Thank you Lisa for all your efforts!

Well folks, that's it for May! One good thing about May is the abundance of dandelions in my backyard and the smiles on the faces of my grateful herbivores! (Aren't they smiling?)

Keep your herps happy and healthy as always!

Sincerely, Audrey Vanderlinden

E-mail: Uromastica@aol.com

FUTURE BOARD MEETINGS

The dates for the next two meetings of the Board of Directors of the Chicago Herpetological Society are June 18 and July 16. Meetings are generally held at 7:30 P.M. in the Administration Building of the North Park Village complex, 5801 N. Pulaski in Chicago. For more information and to verify the dates and location, please contact Audrey Vanderlinden at (773) 836-2477 or E-mail <uromastica@aol.com>.

MOVING??

Please let us know in plenty of time of any change in your mailing address. The *Bulletin of the Chicago Herpetological Society* is sent to our U.S. members by bulk-rate third class mail. This means that the U.S. Post Office will not forward your *Bulletin* with the rest of your mail. This is so even if you make a special request that your magazines be forwarded (such a request only applies to second class mail).

Unofficial Minutes of the CHS Board Meeting, April 16, 1999

The meeting was called to order at 7:38 P.M., with all board members present.

Officers' and Committee Reports

The minutes of the March Board of Directors meeting were read, corrected and accepted.

The Treasurer's report was read and accepted. Gary Fogel reported that ReptileFest expenses remain within budget.

Membership stands at approximately 925. Many new membership applications continue to arrive on forms that have been printed from the CHS website. Gino Martinez is in the process of compiling a new membership list.

Speaker Update: The speaker agenda remains the same but Mike Dloogatch reported that he is waiting to hear from a potential speaker for the September meeting.

Adoptions: Rich Crowley reported that he has arranged for adoptions of several box turtles and small snakes but that iguanas are still a problem.

Shows: Mike Scott and Jenny Vollman will display at the Volo Bog Sunday, April 19. The Shedd Aquarium has expressed interest in a CHS presence at their member's night.

ReptileFest: Lori King-Nava and Gary Fogel will be on Steve Dale's WGN radio show on April 17, to promote the 'fest and to discourage people from purchasing chameleons after seeing them on the Budweiser commercials. ReptileFest press kits got noticed by Mayor Daley who as of April 2 officially proclaimed May 1–2 as "Herpetological Days in Chicago." An official signed statement by the mayor was presented to the CHS. Paul Sereno has faxed Lori that he will display his *Carcharodontosaurus* model skull. The Shedd Aquarium has expressed interest in a vendor's table and Ron Humbert reported that there are a record number of exhibitors and vendors signed up.

Old Business

Audrey passed around a sign-up sheet for the Louisville Zoo trip.

Gary Fogel reported that he has arranged through Rob Carmichael to donate the old CHS modular cage unit to the Lake Forest Park District.

New Business

Mike Dloogatch received a call from Dr. Gery Herrmann who informed him that this year the Illinois Reptile and Amphibian Veterinary Medicine Award will be shared by two downstate vet students. Mike moved to grant one-year CHS memberships to both winners. The motion was seconded by Greg Brim and the vote was unanimous in favor.

Rich Crowley reported that he has been taking too much of a financial burden in the adoption business, through the constant returning of phone calls, many of which are long distance or toll calls. Mike Dloogatch stated that he need only submit receipts for this or any other less-than-$25 expense on behalf of the CHS and he would be reimbursed by the treasurer.

Round Table

Greg Brim expressed his feeling that the board meetings have been really great lately.

Don Wheeler showed the board several posters that he had made by blowing up the ReptileFest posters and hand coloring them.

Lori King-Nava mentioned that WGN had included a mention of ReptileFest on its website.

Gary Kostka inquired about the Chicago Academy of Sciences and where the CHS stands with them. A discussion ensued.

Lisa Koester raised the possibility of the CHS starting up a herp husbandry list server on the Internet.

Mike Dloogatch urged everyone to read Gary Kostka's column in the April *Bulletin*.

Audrey Vanderlinden informed the board that her talk on uromastyx lizards to the Central Illinois Herpetological Society went very well. They were hospitable and showed great enthusiasm about ReptileFest. Some planned to come.

Rich Crowley said that he would be getting married next year and is not sure if he will be able to continue as adoptions coordinator.

The meeting adjourned at 9:05 P.M.

Respectfully submitted by Recording Secretary Karen Bielski

Advertisements

American Federation of Herpetoculturists: A nonprofit national membership organization of herpetoculturists, veterinarians, academicians and zoo personnel involved in the captive husbandry and propagation of amphibians and reptiles. Membership includes highly acclaimed magazine, *The Vivarium*, dedicated to dissemination of information on herpetocultural accomplishments, herp medicine, breeding and maintenance, field studies and adventures, enclosure design and much more. AFH membership is $26. Send information requests to: AFH-News, P.O. Box 300067, Escondido CA 92030-0067.

Attention: **New regional herpetological study group affiliate to form.** The formation of a Redwood Region Herpetological Affiliate (Society) is proposed by local area herpetologists. Anyone interested in the herpetological taxa inhabiting the Redwood Coastal Belt of the northern Pacific coastal regions of North America is cordially invited to join. A formational meeting is proposed to be conducted at the Humboldt State University campus, Arcata, California, in June 1999. Please contact Bradford Norman through: BRN, c/o Redwood Region Herpetological Affiliate (Society), 69 Midway Court, Arcata CA 95521, or call (707) 445-8252 or (707) 442-5977.

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail <GrmtRodent@aol.com>.

For sale: murine-pathogen-free rats and mice available in all sizes, live or frozen: pinkies, fuzzies, crawlers, small, medium and large. Frozen crawler mice in lots of 2000, $.17 each. Also available, full grown hairless mice. FOB shipping point. Master Card accepted. Call (518) 537-2000 between 8:00 A.M. and 5:00 P.M. or write SAS Corporation, 273 Hover Avenue, Germantown NY 12526 for prices and additional information.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. New prices, new sizes, and now rats! Our mice and rats are vacuum-packed to greatly extend freezer life by reducing freezer burning and preserving vitamin and nutrient content. We feed our colony a nutrtionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice: pinkies, $.25; fuzzies, $.30; hoppers, $.35; weanling, $.40; adult, $.45. Rats: starting with pinks at $.40 each, to XL at $1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. P.O. Box 85, Alpine TX 79831. Call us toll-free at (800) 720-0076 or visit our web site <www.themousefactory.com>.

For sale: from Bayou Rodents, excellent quality feeder mice and rats. Every size available. Pinks starting at $20/100. Orders are shipped by overnight service Monday thru Thursday. We accept Visa, MasterCard and Discover. For more info, contact Rhonda or Peggy, (800) 722-6102.

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice availabe: small newborn pinks up to jumbo adults. Prices start at $25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: Herp bags—colors vary, translucent ripcord nylon, super lightweight, extremely durable construction with hot corners sewn in, double seamed. Custom sizes made upon request. Sizes: 46" × 14", $7 each; 24" × 12", $6 each; 24" × 6", $5 each. Shipping fees, $1 for first bag, $.30 each additional bag. Nicole Lechowicz, 2511 S. Illinois Avenue, #104, Carbondale IL 62901, (618) 457-2783.

For sale: Air Filter purifier w/ germicidal ultraviolet internal light and filters by JWR—used. Bought for $500; looking for best offer. Colin, (773) 784-4669, E-mail: <colintk@msn.com>.

For sale: Neodesha reptile cages—4' with divider, elongated vents, litter dam, Flex-watt heat and 2' lights, $165; 2' with glass door, elongated vents, $35. All in excellent condition. (708) 361-5835.

For sale: stainless steel "pinkie pump," all parts included; and new HabiStat dimming thermostat with nighttime temperature drop function, designed for use with light bulbs and other heaters. $60 takes both. Shawn Bjerke, P.O. Box 5818, Fargo, ND 58105, (701) 235-7263. E-mail: <sbjerke@mail.ff.cc.mn.us>.

For sale: Collection of herp books including some rare/hard to find titles. Send E-mail or stamp for list. Shawn Bjerke, P.O. Box 5818, Fargo ND 58105. E-mail: <sbjerke@mail.ff.cc.mn.us>.

For sale: Captive Breeding Magazine, (Vol.1, Nos.1–4; Vol.2, Nos.1–4; Vol.3, Nos.1–2), 1992–1995. All in mint condition. Will sell for best offer over $70. Shawn Bjerke, P.O. Box 5818, Fargo, ND 58105. E-mail: <sbjerke@mail.ff.cc.mn.us>.

For sale: Two large male red-footed tortoises, both approx. 13", long-term captives, excellent health, $225 each or both for $400. Also, two wooden cages (their winter homes), exterior dimensions 60" × 24" × 21", glass sliding doors, 48" interior Vita-lite, heating pad, $50 each, will not sell either before the tortoises. John Jr., (708) 857-7929.

For sale: yearling argus monitor, $175; albino eastern kingsnake (*Lampropeltis g. getula*), $300; yearling black-tailed cribo, $200; young, red, Colombian boa, $50; assorted sizes, colors, sexes Mali uromastyx, LTC, $60–75; yearling Moroccan uromastyx, $125; LTC male chuckwalla, $60; two adult male locality rosy boas, $50 and $75. Mike Malawy, (630) 717-9955 evenings and weekends, E-mail: <mike@herpworld.com>.

For sale: **Black-headed pythons**, c.h. 10 April 1999 from beautifully patterned adults produced at the San Diego Zoo in 1992. Pairs and one trio available. Eric R. Skov, HC 60 Box 175, Wells NV 89835, (775) 752-3909 telephone, or (775) 752-3643 fax.

For sale: one male and one female St. Lucia Island boas, *Boa constrictor orophias*, 1998, 2', $2000/pair; two male and two female green anacondas, *Eunectes murinus*, 1999, 2½', super tame, eating rats, $300 each; two male and two female green anacondas, 1997, 4–5', super tame, rats or rabbits, $500 each; one male and one female yellow-headed reticulated pythons, 1997, 7', tame, $400 each. Terry Wilkins, 2500 Morse Road, Columbus OH 43231, (614) 337-8071.

For sale: 16" female variable kingsnake, *Lampropeltis mexicana thayeri*, c.h. '97, buckskin; 26" male variable kingsnake, c.h. '96, outstanding red, black, olive; 28" male Pueblan milksnake, c.h. '96, good color. $100 for the trio. Shawn Bjerke, P.O. Box 5818, Fargo, ND 58105, (701) 235-7263. E-mail: <sbjerke@mail.ff.cc.mn.us>.

For sale: **1999 prospective hatchlings**: Baird's ratsnakes, $15 each; prairie kingsnakes, $15 each; California kingsnakes, $20 each; speckled kingsnakes, $15 each; albino speckled kingsnakes, $25 each; Mexican black kingsnakes, $30 each; red milksnakes, $30 each; Sinaloan milksnakes, $35 each; Pueblan milksnakes, $35 each; Mexican milksnakes, $40 each; Queretaro or Ruthven's kingsnakes, $50 each; Nuevo Léon kingsnakes (*thayeri*), $65 each; gray-banded kingsnakes, $50 each; Durango mountain kingsnakes (*greeri*), $75 each; Arizona mountain kingsnakes, $125 each; prairie/speckled crosses, $20 each. **Breeders, available May–June:** one male and one female Baird's ratsnakes, $100; one male and one female *annulata*, $200; one male and two female prairie kings, $135; one male and one female albino speckled kings, $150; one male and one female Mexican black kings, $175; one male and three female red milksnakes, $250; two female Sinaloan milksnakes, $175; one male and two female Pueblan milksnakes, $250; one male and one female Ruthven's kingsnakes, $250; one male and one female Nuevo Léon kingsnakes (*thayeri*), $250; one male and two female Durango mountain kingsnakes, $300; one male and one female *mexicana mexicana*, $135; two male and two female prairie/speckled crosses, $85/pair; one male and two female California kings, $150. Steve Mitchener, (405) 748-6566 after 6:00 P.M. Central Time. [OK]

For sale: Great snakes, great service. Send SASE for list. Applegate, P.O. Box 338, Campo CA 91906, (619) 478-5123. E-mail: <applesnake@juno.com>. Website: <www.applegatereptiles.com> Thank you, call me.

Advertisements (cont'd)

For sale: **Adults:** male het ghost, $60; black king, $55; male *thayeri* (milksnake phase), $100; pair of ball pythons, $175/pair; Indonesian bluetongue, $55; *Rhacodactylus auriculatus*, c.b. '98, $150; *Phelsuma madagascariensis grandis*, c.b. '98, $20. Flexwatt heat tape, $2.50/ft, $5 each connection. Steve Bostwick (515) 274-4580, E-mail <liasis@juno.com>. [IA]

For sale: jungle carpet pythons. 4½–5' male, great feeder, jet black and bright yellow, proven breeder, $350; 3', 2-year-old male, "Lazik" bloodline, awesome color, $250; 8-month-old female, choice, held back from last year, perfect specimen, vertebral stripe, great eater, $175.
Mark Petros, Strictly Serpents, (847) 854-3259 home, (847) 854-2992 work.

For sale: Send SASE to CRC, P.O. Box 0731, Las Vegas NV 89125-0731 for brochures and list of species available. Limited bookings available for guided tours of herpetological collection sites in Nevada. Call/fax (702) 450-0065. URL <http://www.herp.com/crc/> E-mail <crcsafetie@aol.com>.

Tours: Adventure tours to Madagascar! Join **Bill Love** seeing and photographing fauna and flora, heavily herp-biased, across the world's least known mini-continent. Maximum fun & photo ops assured on every trip. Contact him at: BLUE CHAMELEON VENTURES, P.O. Box 643, Alva FL 33920. TEL: (941) 728-2390, FAX: (941) 728-3276, E-MAIL: <blove@cyberstreet.com>.

Tours: **Road-riding in Costa Rica!** Treat yourself to the trip of a lifetime! Learn about tropical herps, find them, photograph them, see where they live. **Greentracks, Inc.**, offers the best herpetological tours led by internationally acclaimed herpetologists and herpetoculturists. See the Amazon, visit cloud forests, experience the world's greatest rainforest, super sunsets and good company. Call (800) 9-MONKEY.

Video: *Rattlesnake Hunting*, a 60-minute video by a 30-year veteran collector. Don't miss this one! It's as close to being in the field as you can get. (Not a slick commercial production.) Send check or money order for $19.95 plus $3 postage & handling to: D. Wheeler, 2705 Sunset Trail, Riverwoods IL 60015. Allow 4–6 weeks for delivery.

Wanted: glass cube tanks, approx. 9" × 9" × 8½"H. No leakers. Please advise asking price and condition. Claus Sutor, (847) 824-1545.

Wanted: ANY INFO on Tennessee herp clubs, shows and happenings; preferably in the Memphis area. Also any info on *Afroedura hawequensis* would be great. Kelli Swayne, 2633 Van Eaton Cv., Memphis TN 38133, or E-Mail: <OPHIDIO76@aol.com>.

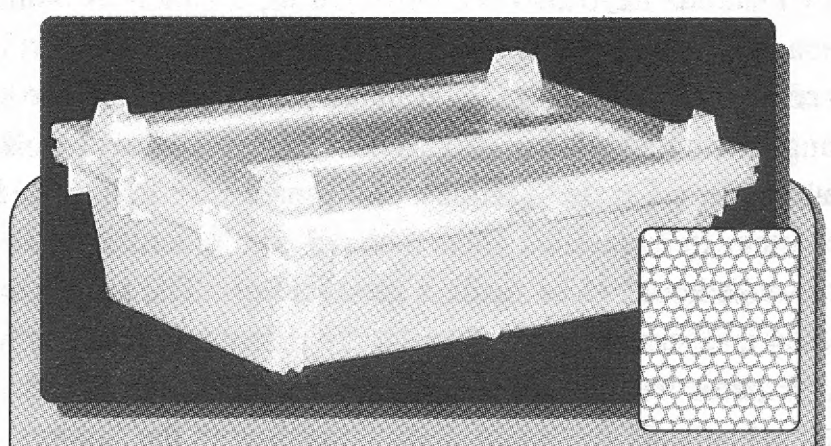
Wanted: big-headed turtles; mata mata turtles; Mexican giant mud turtles (*Staurotypus triporcatus*); exceptionally large common snappers (45 lbs. & up); large alligator snappers (over 90 lbs.); spectacled caiman from Trinidad, Tobago and Surinam; dwarf caiman; smooth-fronted caiman; albino turtles (except red-eared sliders). Walt Loose, (610) 926-6028, 9:00 A.M. – 1:00 P.M. or after 11:30 P.M. Eastern Time.

Wanted: unusual/aberrant garter snakes and unusual/aberrant/large rubber boas. Scott, (919) 934-0110, EST. [NC]

Line ads in this publication are run free for CHS members — $2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (773) 588-0728 evening telephone, (312) 782-2868 fax, E-mail <MADadder0@aol.com>.

Health Food for your herps!

Highest quality rodents are available in all sizes from pink mice to jumbo rats. Fresh frozen crawler mice are only 17¢ each in lots of 2,000. All frozen animals are shipped in insulated boxes.



Nearly 9,000 holes and they still can't escape!

The new TTC is ideal for transporting, breeding and storing your mice, rats, snakes and lizards. The strong plastic TTC has over 2,200 holes on each side and over 4,500 holes on the lid to provide maximum air circulation even when stacked. Each TTC can be divided into 2, 3 or 4 compartments and its smooth plastic construction makes washing a snap.

SAS

273 Hover Avenue • Germantown, NY 12526-5320
518-537-2000 • Fax 518-537-7287

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, May 26, at the Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, in Chicago. Speaking at this meeting will be **Tom Tyning**, staff herpetologist for the Massachusetts Audubon Society and author of *A Guide to Amphibians and Reptiles*, one of the Stokes Nature Guides series. Tom's program deals with "Uncommon Stories about Common Amphibians and Reptiles." He'll reaquaint you with some of your backyard animals, introduce some more exotic forms, and will also make a plea for more observations and especially conservation of local populations and the ecological communities that support them.

Our annual **Show & Tell** meeting is set for June 30. All members are encouraged to bring a favorite animal and to be prepared to come up on stage and tell us something about the animals they have brought.

We are required to use the entrance on the west side of the museum. **We are allowed to use the free parking lot to the west of the museum. Entrance to this lot is from McFetridge Drive, the wide street just to the south, between the museum and Soldier Field.** Public transportation is an option: the Roosevelt Road (12th Street) bus goes directly to the museum, thus providing a connection with the el and subway. This bus service runs until 11 P.M.

The Chicago Turtle Club

The Chicago Turtle Club will meet on Sundays, May 23 and June 27, 1:00 – 3:30/4:00 P.M., at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Meetings are informal. Questions, children and animals are welcome. Parking is free and there is no admission. For more information call Lisa, (773) 508-0034 or visit the CTC web site: <http://www.geocities.com/~chicagoturtle>.

HERP PARASITOLOGY WORKSHOP

The Chicago Herpetological Society will offer a workshop on herp parasitology at 10:00 A.M. Saturday, May 29, at the Grove Nature Center, 1421 Milwaukee Avenue, in Glenview. The session will be conducted by Cheryl Roge, D.V.M. Because there are a limited number of microscopes available, the class will be limited to 12 participants. Therefore you must register beforehand if you wish to attend. Sign up by calling Audrey Vanderlinden at (773) 836-2477 or via E-mail to <uromastica@aol.com>. Bring fresh fecal samples from your herps. You will learn about parasites and how they affect the health of your herps. You will be able to view parasites under a microscope and learn to recognize infestations. The workshop will last approximately two hours.

LOUISVILLE ZOO TRIP

It's that time of year again! Sign up for the CHS zoo trip—this year to the Louisville Zoo on Saturday, June 19. This is a great opportunity to enjoy a day at the zoo with fellow CHS members. The newest additions to the zoo's herp collection are a pair of young Komodo dragons! The bus will depart at 6:00 A.M. from the vicinity of the North Park Village Nature Center at Pulaski and Bryn Mawr. Parking will be along the south side of Bryn Mawr Avenue, same as last year. We will arrive at the zoo around 11:00 A.M. and depart at 5:00 P.M. We will make a fast food dinner stop on the way home. Snacks and sack lunches are encouraged or you can buy food at the zoo. The cost is $46.50 per participant, covering round-trip bus fare on an air-conditioned luxury motorcoach complete with VCRs, and admission to the zoo. Seating is limited, so sign up early! Paid reservations are required. Make checks payable to the CHS. For reservations and further details, call Audrey Vanderlinden at (773) 836-2477 or E-mail <uromastica@aol.com>.

THE ADVENTURES OF SPOT

NONPROFIT ORG.
U.S. POSTAGE
PAID
PERMIT NO. 9869
CHICAGO, ILLINOIS

CHICAGO HERPETOLOGICAL SOCIETY

Affiliated with the Chicago Academy of Sciences

2060 North Clark Street • Chicago, Illinois 60614